CLAIMS

1. A method comprising:

receiving audio samples representing an input audio signal;

transforming the input audio samples into a vector of spectral values in a frequency domain; and

determining a value of a quantizing parameter that satisfies one or more criteria based, at least in part, on a modified Newtonian search process, the determined value of the quantizing parameter being used to quantize the respective vector of spectral values to generate a vector of quantized values.

2. The method of claim 1 wherein determining the value of the quantizing parameter includes:

determining the value of the quantizing parameter such that a maximum quantized value does not exceed a maximum index of one or more corresponding codebooks.

3. The method of claim 2 wherein the one or more codebooks are used to requantize the quantized values.

4. The method of claim 3 wherein the one or more codebooks are Huffman code tables.

5. The method of claim 2 wherein the value of the quantizing parameter is determined according to the following formula:

$$\text{global\_gain} \geq \left\lceil A \cdot \log_2\left(\frac{\text{MAX}|x_r(i)|}{[B-C]^D}\right)\right\rceil$$

wherein global_gain corresponds to the value of the quantizing parameter, A corresponds to a first constant, xr(i) corresponds to an original spectral value for frequency line i, B corresponds to a second constant representing a maximum quantized spectral value, C corresponds to a third constant, and D corresponds to a fourth constant.

6. The method of claim 1 wherein determining the value of the quantizing parameter includes:

determining the value of the quantizing parameter based on the modified Newtonian search process such that a total number of bits used for encoding the vector of quantized values does not exceed a maximum number of bits available for encoding the vector of the quantized values.

7. The method of claim 6 including:

computing a first estimate and a second estimate for the quantizing parameter; and

performing a set of operations iteratively until a predetermined number of iterations is reached, including:

deriving a new estimate for the quantizing parameter based on the previous estimates for the quantizing parameter.

8. The method of claim 7 wherein deriving the new estimate includes:

calculating a line tangent to a function representing the total number of bits used based on the previous estimates; and

calculating the new estimate based on an intercept between the line tangent calculated and a line representing the maximum number of bits available.

9. The method of claim 7 wherein performing the set of operations further including:

determining whether the total number of bits based upon the new estimate exceeds the maximum number of bits available;

if the total number of bits based upon the new estimate exceeds the maximum number of bits available, increasing the new estimate by a first factor; and

if the total number of bits based upon the new estimate does not exceed the maximum number of bits available, decreasing the new estimate by a second factor.

10. The method of claim 9 wherein the first factor and second factor are integer values.

11. The method of claim 7 wherein the value of the quantizing parameter determined with respect to one block of spectral values is stored in memory and used as an initial estimate for a next block of spectral values.

12. An apparatus comprising:

logic to receive input audio samples representing corresponding input audio signals;

logic to transform the input audio samples into a vector of spectral values in a frequency domain; and

logic to determine a value of a quantizing parameter that satisfies one or more criteria based, at least in part, on a modified Newtonian search process, the determined value of the quantizing parameter being used to

quantize the respective vector of spectral values to generate a vector of quantized values.

13. The apparatus of claim 12 wherein logic to determine the value of the quantizing parameter includes:

logic to compute the value of the quantizing parameter such that a maximum quantized value does not exceed a maximum index of one or more corresponding codebooks.

14. The apparatus of claim 13 wherein the value of the quantizing parameter is determined according to the following formula:

$$\text{global\_gain} \geq \left\lceil A \cdot \log_2\left(\frac{MAX|x_r(i)|}{[B-C]^D}\right)\right\rceil$$

wherein global_gain corresponds to the value of the quantizing parameter, A corresponds to a first constant, xr(i) corresponds to an original spectral value for frequency line i, B corresponds to a second constant representing a maximum quantized spectral value, C corresponds to a third constant, and D corresponds to a fourth constant.

15. The apparatus of claim 12 wherein logic to determine the value of the quantizing parameter includes:

logic to determine the value of the quantizing parameter based on the modified Newtonian search process such that a total number of bits used for encoding the vector of quantized values does not exceed a maximum number of bits available for encoding the vector of the quantized values.

16. The apparatus of claim 15 including:

logic to compute a first estimate and a second estimate for the quantizing parameter; and

logic to perform a set of operations iteratively until a predetermined number of iterations is reached, including:

logic to derive a new estimate for the quantizing parameter based on the previous estimates for the quantizing parameter.

17. The apparatus of claim 16 wherein logic to derive the new estimate including:

logic to calculate a line tangent to a function representing the total number of bits used based on the previous estimates; and

logic to calculate the new estimate based on an intercept between the line tangent calculated and a line representing the maximum number of bits available.

18. The apparatus of claim 17 wherein logic to perform the set of operations further including:

logic to determine whether the total number of bits based upon the new estimate exceeds the maximum number of bits available;

logic to increase the new estimate by a first integer if the total number of bits based upon the new estimate exceeds the maximum number of bits available; and

logic to decrease the new estimate by a second integer if the total number of bits based upon the new estimate does not exceed the maximum number of bits available.

19. A system comprising:

a transformation unit to transform input audio samples representing corresponding audio signals into a vector of spectral values in a frequency domain;

a psychoacoustic modeling unit to analyze the input audio samples and generate a frequency mask; and

a bit allocator and quantizer unit coupled to the transformation unit and the psychoacoustic unit, the bit allocator and quantizer unit including:

logic to determine a value of a quantizing parameter that satisfies one or more criteria based,

at least in part, on a modified Newtonian search process, the determined value of the quantizing parameter being used to quantize the respective vector of spectral values to generate a vector of quantized values.

20. The system of claim 19 wherein logic to determine the value of the quantizing parameter includes:

logic to compute the value of the quantizing parameter such that a maximum quantized value does not exceed a maximum index of one or more corresponding codebooks, based upon the following formula:

$$\text{global\_gain} \geq \left\lceil A \cdot \log_2\left(\frac{MAX|x_r(i)|}{[B-C]^D}\right)\right\rceil$$

wherein global_gain corresponds to the value of the quantizing parameter, A corresponds to a first constant, xr(i) corresponds to an original spectral value for frequency line i, B corresponds to a second constant representing a maximum quantized spectral value, C corresponds to a third constant, and D corresponds to a fourth constant.

21. The system of claim 19 wherein logic to determine the value of the quantizing parameter includes:

logic to determine the value of the quantizing parameter based on the modified Newtonian search process such that a total number of bits used for encoding the vector of quantized values does not exceed a maximum number of bits available for encoding the vector of the quantized values.

22. The system of claim 21 including:

logic to compute a first estimate and a second estimate for the quantizing parameter; and

logic to perform a set of operations iteratively until a predetermined number of iterations is reached, including:

logic to derive a new estimate for the quantizing parameter based on the previous estimates for the quantizing parameter.

23. The system of claim 22 wherein logic to derive the new estimate including:

logic to calculate a line tangent to a function representing the total number of bits used based on the previous estimates; and

logic to calculate the new estimate based on an intercept between the line tangent calculated and a line representing the maximum number of bits available.

24. The system of claim 23 wherein logic to perform the set of operations further including:

logic to determine whether the total number of bits based upon the new estimate exceeds the maximum number of bits available;

logic to increase the new estimate by a first integer if the total number of bits based upon the new estimate exceeds the maximum number of bits available; and

logic to decrease the new estimate by a second integer if the total number of bits based upon the new estimate does not exceed the maximum number of bits available.

25. A machine-readable medium comprising instructions which, when executed by a machine, cause the machine to perform operations including:

receiving audio samples representing an input audio signal;

transforming the input audio samples into a vector of spectral values in a frequency domain; and

determining a value of a quantizing parameter that satisfies one or more criteria based, at least in part, on a modified Newtonian search process, the determined value of the quantizing parameter being used to quantize the

respective vector of spectral values to generate a vector of quantized values.

26. The machine-readable medium of claim 25 wherein determining the value of the quantizing parameter includes:

determining the value of the quantizing parameter such that a maximum quantized value does not exceed a maximum index of one or more corresponding codebooks according to the following formula:

$$\text{global\_gain} \geq \left\lceil A \cdot \log_2\left(\frac{\text{MAX}|x_r(i)|}{[B-C]^D}\right)\right\rceil$$

wherein global_gain corresponds to the value of the quantizing parameter, A corresponds to a first constant, xr(i) corresponds to an original spectral value for frequency line i, B corresponds to a second constant representing a maximum quantized spectral value, C corresponds to a third constant, and D corresponds to a fourth constant.

27. The machine-readable medium of claim 26 wherein determining the value of the quantizing parameter includes:

determining the value of the quantizing parameter based on the modified Newtonian search process such that a total number of bits used for encoding the vector of

quantized values does not exceed a maximum number of bits available for encoding the vector of the quantized values.

28. The machine-readable medium of claim 27 including:

computing a first estimate and a second estimate for the quantizing parameter; and

performing a set of operations iteratively until a predetermined number of iterations is reached, including:

deriving a new estimate for the quantizing parameter based on the previous estimates for the quantizing parameter.

29. The machine-readable medium of claim 28 wherein deriving the new estimate includes:

calculating a line tangent to a function representing the total number of bits used based on the previous estimates; and

calculating the new estimate based on an intercept between the line tangent calculated and a line representing the maximum number of bits available.

30. The machine-readable medium of claim 29 wherein performing the set of operations further including:

determining whether the total number of bits based upon the new estimate exceeds the maximum number of bits available;

if the total number of bits based upon the new estimate exceeds the maximum number of bits available, increasing the new estimate by a first factor; and

if the total number of bits based upon the new estimate does not exceed the maximum number of bits available, decreasing the new estimate by a second factor.